Tests: Suzuki GS1100 and RM250, Yamaha IT175
Harley-Davidson Sportster, Honda V45 Sabre

How To Find the Right Tire For Your Bike

CYCLE WORLD®

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America's Leading Motorcycle Enthusiasts' Publication

Honda V-Four Sabre

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HONDA V45 SABRE

With Every Sports Chassis and Miracle Motor You Get Your Very Own Video Arcade

CYCLE WORLD TEST

■ When Honda unveiled the 1982 models the headline news was the 750cc V-Four engine. Water-cooled, crankshaft set across the frame, shaft drive, double overhead camshafts working four valves per cylinder, the new motor wasn't like anything seen before, not from Honda or anybody else. There seemed to be two versions; cruiser-style Magna for the custom fancier, sporting Sabre for the performance set. Oh yes, we said to ourselves, kinda like the CB900F and the CB900C; same basic package but with different styling.

Not at all. The Magna arrived in showrooms and magazines first, as Honda figured to sell two Magnas for every one Sabre and wanted an early start. The Magna was tested in the May issue and we found it quick, comfortable and customized a bit too much for fast roadwork.

Comes now the Sabre. Instead of being the same bike with different outsides, the Sabre is a completely different bike, doubly different for Honda. All Sabre and Magna have in common is the engine.

The V-Four was described in detail in the May issue but to review, the banks of water-cooled cylinders are 90° apart, the forward bank being almost horizontal and the rear bank being almost vertical. Each cylinder has four valves (two 26mm intakes, two 23mm exhaust) mounted at a very narrow angle (38°) in a shallow combustion chamber with swirl-inducing squish area ridges. The valves are operated by dohc via forked rockers with screw tappets. Cam timing is 5°-40° intake and 40°-5° exhaust with 8mm lift. The engine is very oversquare, with a bore of 70mm and a stroke of 48.6mm, and the connecting rods are unusually long at 117mm center to center, yielding a torque-producing rod-to-stroke ratio of 2.4:1. Flat-domed, three-ring cast pistons produce a c.r. of 10.5:1. The plain bearing crankshaft has four main bearings and two throws on the same plane. In the center of the crankshaft are two link-plate cam chain sprockets, flanked by the center main bearings.

Primary drive is straight-cut gear. The clutch basket gear is actually two thin gears, mounted slightly offset and tensioned by the clutch basket damping springs to control gear lash and reduce mechanical noise.

The transmission has six speeds, and Honda calls sixth Overdrive. Actually, the first five gears have normal spacing and ratios roughly equivalent to the five-speed transmission used in the CB750F. Sixth is just another ratio added on, not a true overdrive in a separate gearbox.

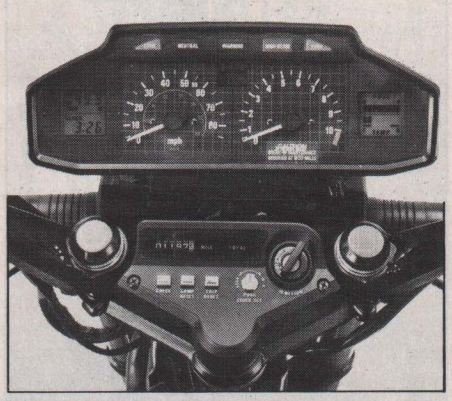
Final drive is shaft, driven directly off the countershaft without an intermediate gearbox or output shaft. A set of four 32mm Keihin CV sidedraft/downdraft carburetors nestles between the banks of cylinders and breathes through an oiled foam air filter. Exhaust pipes for the forward bank curve down ahead of and below the engine; pipes for the rear cylinders curve behind the engine, and they all meet in an expansion box mounted in front of the swing arm.

The alternator rides on the left end of the crankshaft, the electronic ignition pickups are on the right, in an oil bath. Ignition advance is electronically controlled.

Because the forward pistons rise and fall together and the rear pistons go up and down together, the effect is that of mating two V-Twins, one revolution apart.

The Sabre's instrumentation is as close to Houston Control, or maybe the local video arcade, as a motorcycle can get. Flanking the electric tachometer and speedometer is a series of liquid crystal display (LCD) faces. They report the usual data, as in fuel level, coolant temperature and oil pressure. In the center is a read-out for gear position, as in 1-N-2, etc. with 6 being replaced by OD.

This central display also serves as a back-up warning for the other warnings. If, for example, a taillight or brake light bulb goes, the warning panel displays "T.LGT" instead of gear position while a red light flashes.



Sabre's instrument panel serves up an impressive array of facts whether the rider wants them or not. Tripmeter, clock/stopwatch, fuel gauge, temperature gauge and warning system all use LCDs.

These instruments and their controls are actually more complicated than they appear at first glance. Consider the warning light. When a problem is detected—let's start with a simple one, low fuel level—the light flashes as the LCD below it signals "FUEL." The warning light flashes 10 times, then settles into a steady red glow. If the rider punches the lamp reset button, the warning light turns off but the LCD "FUEL" display remains. If the rider stops and turns off the engine without refueling, the warning light will flash twice when he restarts and then turn off, and the LCD will still read "FUEL."

If, while the fuel level is low, the battery water also drops below the acceptable level, then the LCD will alternate between "FUEL" and "BATT."

The Sabre also has an unusual automatic cancelling system for the turn signals. The length of time the signals flash is determined by computing steering angle, road speed and duration of steering angle change.

This is tricky. Every turn is initiated by a handlebar movement, whether that movement is tiny at high speed or larger, going into a corner at very low speed. The system records that movement as a change in the steering angle (the angle between the steering stem and the frame, with straight ahead being zero.) An electronic control unit receives information from an angle indicator mounted in the steering wheel head and from the speedometer and cancels the signals after an appropriate interval by triggering a solenoid in the left handlebar control pod, which moves the turn signal switch back to center. If the turn signal is switched on and the bike isn't turned, the signal will be cancelled after 5.0 sec. or 394 ft. at road speeds greater than 28 mph.

The solenoid centers itself every time the ignition is switched on, and that centering action can be heard as a loud click. When the engine is running, solenoid movement can be felt through the left grip.

There's a minor annoyance here as well. This automatic calculation assumes all the facts are known. Somebody miles away has programmed the blinkers to run for a set time under pre-averaged circumstances. This drove one of our riders crazy, because he likes to begin signalling for certain turns well in advance and the road speed times steering angle times dis-

Photos by Steve Kimball

tance shuts the blasted signal off before he gets to the intersection. Sometimes it shut the signals off twice, leading to remarks about who's making this turn, anyway?

There's more. The upper left portion of the panel houses an LCD odometer and a combination clock and stopwatch. Not the sort of stopwatch you use to time laps, but an elapsed time clock. Tiny buttons on the left control pod start and zero the odo, and stop/start/switch the two clocks.

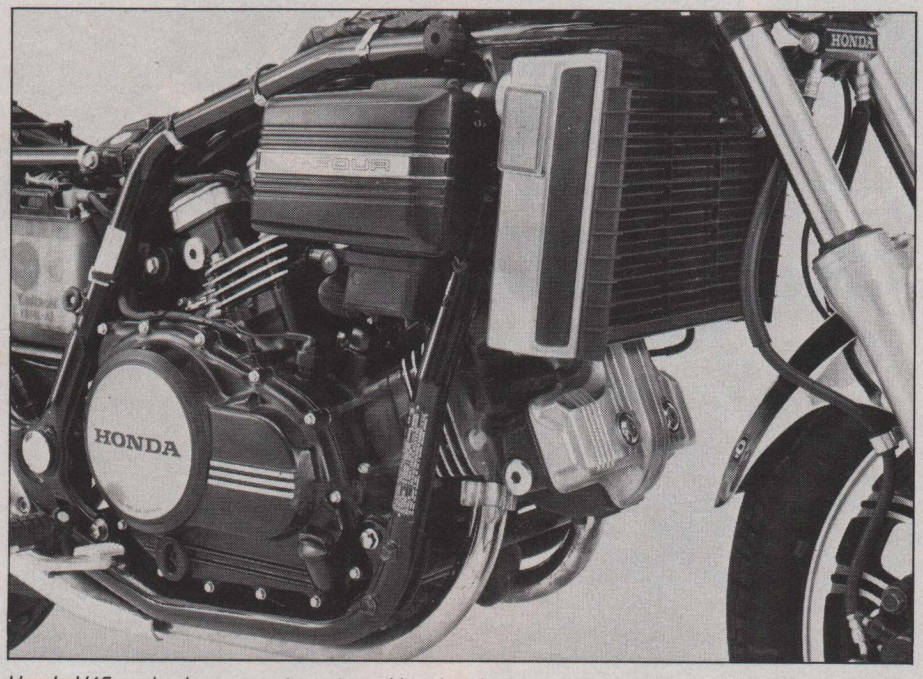
This is a whole heap of data. But the system isn't flawless. One day the clock dropped 40 min. of its own accord. No one could keep the stopwatch working for the length of any trip, no matter how short, until one enterprising editor decided he'd brushed the little button with his bulky winter glove. He kept his hand on the grip and the clock kept ticking or whatever electronic clocks do instead. No, said another rider, it worked because you didn't use the turn signals. It's the vibration from them that stops the clock. And at other times nobody could clear the stopwatch or make the clock display any numbers.

Several riders, initially put off by the LCDs, (saying things like "I can look at the lights and tell if they're working" or "With a reserve position on the petcock, who needs a fuel gauge?") grew to appreciate the systems. One rider found himself religiously resetting the stopwatch before every ride, timing his commutes and errand runs, and punching the warning check button mid-trip. "I don't need to know all this data," he said after one journey, "but it gives me the giggles watching the facts summon themselves to my presence."

And some never got to really like or need or even use the entire apparatus. Well, there are people who haven't played video games yet, while Pac-Man seems to be everywhere. The verdict is someplace between free choice and who cares.

The test did bring one more realistic concern. Forays into heavy stop-and-go city traffic during a mild California February brought the temperature gauge up to the sixth block, triggering the electric cooling fan and an accompanying flood of warm air over the rider. California Februarys are mild. City traffic jams don't go away. We can only speculate what riding the Sabre through downtown will be during an August heat wave.

Designed to add to rider peace of mind is a built-in anti-theft alarm system. Honda likes names the way Suzuki and Harley like initials, so this one is called FOIL, for Fiber Optic Integrated Lock. The system uses a 10mm steel cable with a light-transmitting optical fiber and two small copper wires in its center. The cable stores in a compartment below the left side cover and the system contains its own AA batteries and alarm horn. The cable is long enough to reach around a signpost or bike rack, and the loose end plugs into a locking fitting on the bike. With the cable in place, an ultraviolet LED light emitting diode sends light through the optical fiber to a receiver in the fitting. The receiver sends a signal back to the control box via the two small wires. Cutting the cable severs the optical fiber and the transmitting wires as well, triggering the alarm. The system uses an optical fiber instead of more wires because wires can be jumped and an optical fiber cannot.



Honda V45 engine has screw tappets and just four bolts securing the cam covers. But reaching the forward cylinders' valves requires removing the radiator.

At 61.5 in., the Sabre's wheelbase is about 1.0-in. longer than the Magna's, to fit in the Pro-Link rear suspension, which uses a single shock absorber mounted at its top to the rear frame rails and at its bottom to the swing arm via a pivoting linkage. The system produces a rising spring rate, in theory allowing the suspension to be soft enough to deal with small road irregularities in its initial travel and yet firm enough to handle big bumps as more travel is used.

The Sabre's rear shock has a mechanical spring with air assist, an air casing fitting around the spring. Pressure can be increased to raise ride height and stiffen the ride, or decreased to make interstate highway cruising more comfortable. Maximum suggested pressure is 57 psi, with a minimum of 14 psi.

Rebound damping can also be adjusted, using an L-shaped lever mounted on the shock and accessible, like the air fitting, by removing the seat. There are three positions. The softest or No. 1 position offers the least resistance to rebound and is selected when the lever is pushed all the way in. Position No. 3 is the firmest, with the most resistance to rebound, and is selected when the lever is pushed all the way out. Damping resistance increases about 25 percent between position 1 and position 3.

Like the Magna's frame, the Sabre's frame is made of relatively thin-wall tubing designed to be lighter and stronger than the tubing normally used by Honda. Thinner tubing requires more accurate frame welds but reduces frame weight by about 16 percent.

The Sabre's frame has a removeable section in the left downtube to ease engine installation and removal, and that same section of downtube carries coolant from the radiator to the water pump, located underneath the countershaft cover. The engine bolts to the frame in six places, and is fully rubber mounted.

Besides using Pro-Link, the Sabre frame—as opposed to the Magna frame—has more tubes and gussets in the frame backbone near the steering head, increasing steering head rigidity. The Sabre also has slightly steeper rake (29.5° vs. 30°) and more trail (4.6 in. vs. 4.1 in.).

The Sabre has center-axle forks with 37mm stanchion tubes and Honda's new TRAC anti-dive system build into the left slider. The left brake caliper pivots on its upper mount, moving inward when the brakes are applied, and pushing a plunger valve that diverts compression damping oil from its normal route through a smaller, secondary passageway. The size of the secondary passageway can be adjusted to four positions by turn-


HONDA
HONDA

ing a valve in the side of the fork assembly, with the smallest opening yielding the stiffest compression damping. The plunger valve progressively diverts more and more fork oil as the brakes are applied harder. It is spring loaded, and can be forced back open when oil pressure exceeds spring pressure, as in hitting a sharp bump while braking.

The TRAC system is used on the left slider only, and a cast aluminum alloy fork brace bolts into place between the sliders, above the fender, to keep the forks parallel.

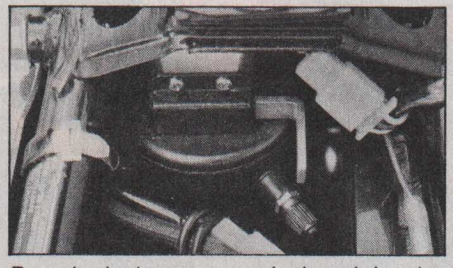
Two 10.8-in. discs with grooves machined into each side are mounted to the wide 2.50 by 18 in. cast aluminum front wheel. The calipers have four pistons, two on each side, each set of pistons pushing a long, rectangular brake pad. The rear brake is a 6.25-in. drum, and rear wheel size is 3.00 by 17, mounting a 130/90-17 Bridgestone 6508 tire.

In combination with the anti-dive set at its stiffest (No. 4) position, the Honda's brakes are stupendous. Unlike the anti-dive systems used by Yamaha and Suzuki, the Honda system does not use brake fluid to activate the valve used to divert the flow of oil in the forks. So the Honda system does not detract from brake power or feel at the lever.

The 110/90-18 Bridgestone L303 front tire has a wide contact patch, which increases available traction for braking, and the progressive feel and sheer power of the Honda's front brake encourages the rider to use the traction. The rear brake is controllable and doesn't lock-up prematurely to distract or complicate stopping. The result is consistently short, controlled stops. The Sabre's best of three 30-0 test stops took 32 ft., the best of three 60-0 stops, 119 ft., best we've seen on a production bike.

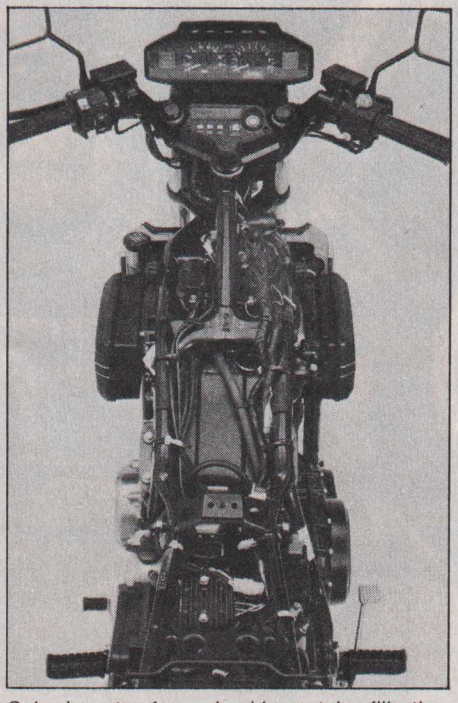
The Sabre has a mildly stepped seat with a grab rail behind. A tail section sweeps back from behind and below the seat and around the taillight lens. The sidecovers read "V45 Sabre" and unify the tailsection and the gas tank. The handlebars are forged aluminum and clip around the fork tubes, above the upper triple clamp. Footpegs are mounted behind the engine cases, and the seating position is comfortable for a range of riders. Some taller riders would have liked the seat a little flatter, others the bars a little lower. But the seat is not too stepped nor the bars too high: every test rider found the seating position reasonable.

From the side the Sabre looks heavier than it is. The engine fills almost all the available space in the chassis, there aren't large spaces between engine and frame. What room isn't taken up by the two banks of cylinders is occupied by the set of carburetors and their airbox. There's a plastic airbox section on each side, a rectangular scoop-looking affair located just below the gas tank and behind the chrome sided radiator. Plastic tunnels leading down the airbox extensions pick up air from behind and above the forward bank of cylinders, after it passes through the radiator.



Rear shock air pressure and rebound damping can be adjusted after the seat is removed. The L-shaped lever selects rebound damping, has three positions. Air fitting allows pressure range from 14 to 57 psi.

Sabre has shaft drive, Pro Link single-rear-shock suspension and drum rear brake.



Sabre's extra frame backbone tube fills the space used by the airbox on the cruiser-styled Magna. So the Sabre's airbox has rectangular extensions on each side.

The Sabre actually weighs 525 lb. with half a tank of gas. It feels lighter than many inline Fours of the same weight because the forward cylinders are lower than the cylinders on an inline. There are moments in the parking lot or when wedging the Sabre between two cars in a garage that the bike feels ungainly and heavy. But when it's moving above a crawl it feels lighter.

This is a fun bike around town. There's something restraining about riding an 1100 to the store or to lunch, a feeling that the bike must be treated with respect. The Sabre didn't have the same effect. Why, we're not sure. Maybe it was the lighter feel, maybe it was the sporty engine note without the brute power of an 1100.

Not having the power of an 1100 doesn't make the Sabre slow. Its quarter mile figures of 12.16 sec. at 108.43 mph are almost a match for the Magna and that quickest 750, the GPz750. Most of the competing 750s are just a little slower than this, though any low 12-sec. motorcycle can't be considered slow.

The engine and its smoothly rhythmic sound are the high points of the Sabre. In terms of performance, midrange torque, response, smoothness and exhaust note this is the nicest engine Honda has ever sold. It doesn't demand long warm-up, and indeed can be ridden off from a cold start almost immediately, with full choke. It pulls well from just off idle yet spins freely to 10,000 rpm and beyond. Thanks to the tall sixth gear, the engine turns less than 3900 rpm at 60 mph. And thanks to the excellent powerband, passing cars or climbing grades doesn't require a downshift.

And it is smooth. It's easy to assume that the total absence of any vibration in the bars, seat and pegs is because the engine is rubber mounted. But put a foot on the V45's engine cases at 65 mph and you'll be amazed. The 90° engine layout offers perfect primary balance, and at 65 mph that perfect balance shows best. The rubber mounts eliminate vibration from secondary imbalances at other speeds.

Carburetion, while allowing the Sabre to be ridden away soon after a brisk morning start, isn't perfect. There's one big flat spot. Come up on a long line of cars on a windy road, downshift and blaze past in a hurry, pull back into your lane, back off the throttle, upshift and roll on the gas. There's a hesitation, a lag in which the engine doesn't accelerate—doesn't *run*—and that's a flat spot. It also shows up when running deep into a turn, backing off the throttle and then dialing it back on.

Gas mileage isn't spectacular. On the *CycleWorld* mileage test loop the Sabre burned a little more than two gallons of gas, for 49.5 mpg. Out on lonely country roads with little traffic, running at extra-legal speeds dropped mileage to a low of

37.5 mpg. Jaunts through the mountains at a brisk pace were good for about 40 mpg, and mixes of highway and city matched the mileage loop's 49 mpg.

The hydraulic clutch has a light pull at the lever but a remote feel. That's no problem under normal conditions. But in extraordinary situations, like the drag-strip, finding the precise clutch engagement point through that tube full of hydraulic fluid is difficult, and the clutch usually grabs. The transmission is better than the transmission in the CB750F in terms of positive engagement, that is, it doesn't have a handful of neutrals and deliver one every time the rider tries to shift from second to third quickly at high rpm. But it's not perfect, and a few test riders occasionally missed second gear. This isn't a Suzuki gearbox.

The Pro-Link rear suspension is more a sales feature than a definite high performance advantage. Pro-Link's claim to fame is rising spring rate, and we're not sold on extreme rising rates for pavement use. In theory, rising rate means that suspension can be soft enough when cruising to deal with repetitive small bumps, like concrete highway expansion joints, and still be stiff enough at speed for sporty riding. But even with the rear shock air pressure set at the lowest recommended setting, the Honda could have been better over expansion joints: the rider felt each one distinctly.

And when the Sabre was pitched into a turn hard, the initial softer bit of travel was used up instantly, and the progressively harder spring rates following could not deal with small bumps encountered in mid-turn.

The Sabre's shaft drive enters into the equation also. Around town the shaft is noticeable when accelerating and turning such as when making a left turn through an intersection. Dial on power for a hard launch down the road and it's easy to feel the shaft torque working against the rear suspension, ultimately causing the rear tire to slip earlier. A little less spring rate progression would help; so would a stickier rear tire; so would strict adherence to posted speed limits and a light hand on the throttle.

Sabre handling and suspension almost deserves a chapter of its own. Riding the Sabre on a race track with street suspension settings isn't much fun. Pitch the bike into a turn under braking and the front end dips—yes, even with anti-dive—while the rear tire skips up and over. Gas it over a bump on a downhill turn and the bars dance clickity-click to the stops and back. Sweep through a fast turn and there's a wallow, not enough to frighten but it does give one pause.

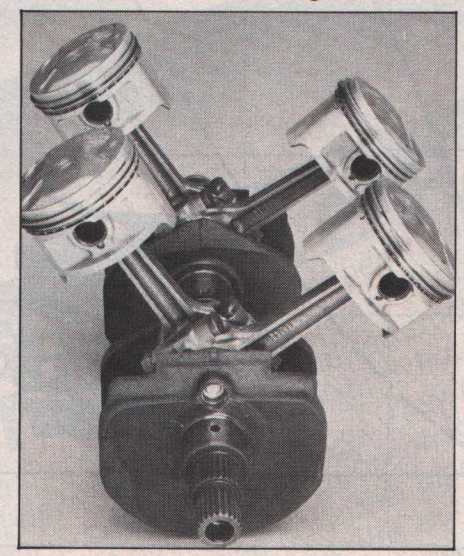
The solutions are as close as the nearest tire pump. With rear shock pressure jacked from 15 to 50 psi, forks up from 6 to 20 psi and shock damping switched from No. 1 to No. 3, high speed work is vastly improved. The wallow is gone. The extra air has raised the ride height and improved cornering clearance. The stiffer forks resist dive and that in turn means less unloading of the rear wheel, which with the firmer rebound damping and stiffer rear springing keeps the rear tire on the ground. Set up this way the Sabre is a match for Kawasaki's GPz750.

On the debit side, the road-race settings also result in a stiff and uncomfortable ride on the street, providing 1) adjustable suspension lets you tune the bike for its planned use, and 2) making it better for one use makes it not so good for another.

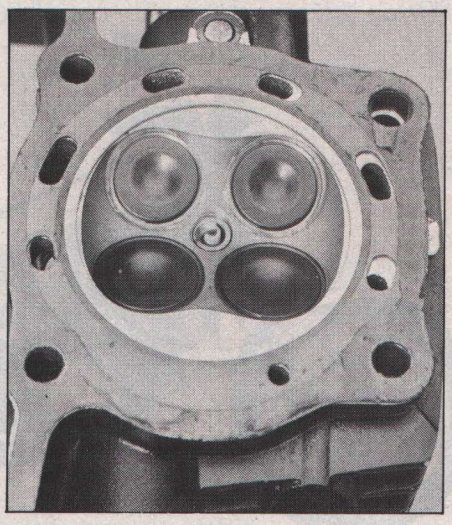
Averaged out, the clearest lesson is how well the engineers have done this particular job. We cannot recall a shaftdrive machine that has displayed less of the system's torque reaction on a track. The Sabre is a big, long motorcycle but its handling, especially through a set of S-turns, belies this. Where the weight is placed, that is, centering the mass in Honda's terms, and the super clearance allowed by suspension tuning make the Sabre easier to turn than its 61.9-in. wheelbase would predict.

The suspension works so well it's a puzzle as to why the Sabre doesn't also have adjustable damping for the forks. The stout bridge between the sliders should add rigidity to the forks but even with that and the air-added stiffness the steering is a bit vague when cranked full over on a fast curve. It could be the front tire, which is mighty big, but it could be something firmer damping would cure. (And it could be Honda figured they'd provided all they could for the money.)

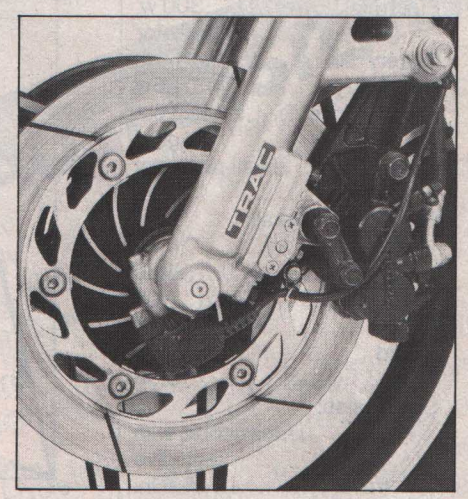
Overall, the Sabre is an impressive motorcycle. It is different, it functions well and it's a dynamite street bike. We wouldn't race one, but not many people need a racebike. We'd definitely own one for the street, for the smoothness, *differentness* and sound alone.



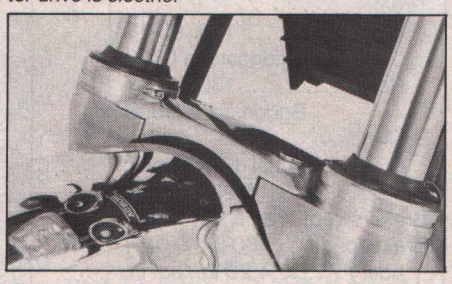
V45 crankshaft has two throws on the same plane, each carrying two rods side-by-side. There are four main bearings.



Shallow combustion chamber uses ridges in squish area to promote swirl. Compression ratio is a detonation-free 10.5:1.



Combination of TRAC anti-dive, slotted discs, four-piston calipers and big front tire make Sabre one of the best stopping 750s ever. Speedometer drive is electric.



Cast alloy bridge between fork sliders keeps the front end rigid.

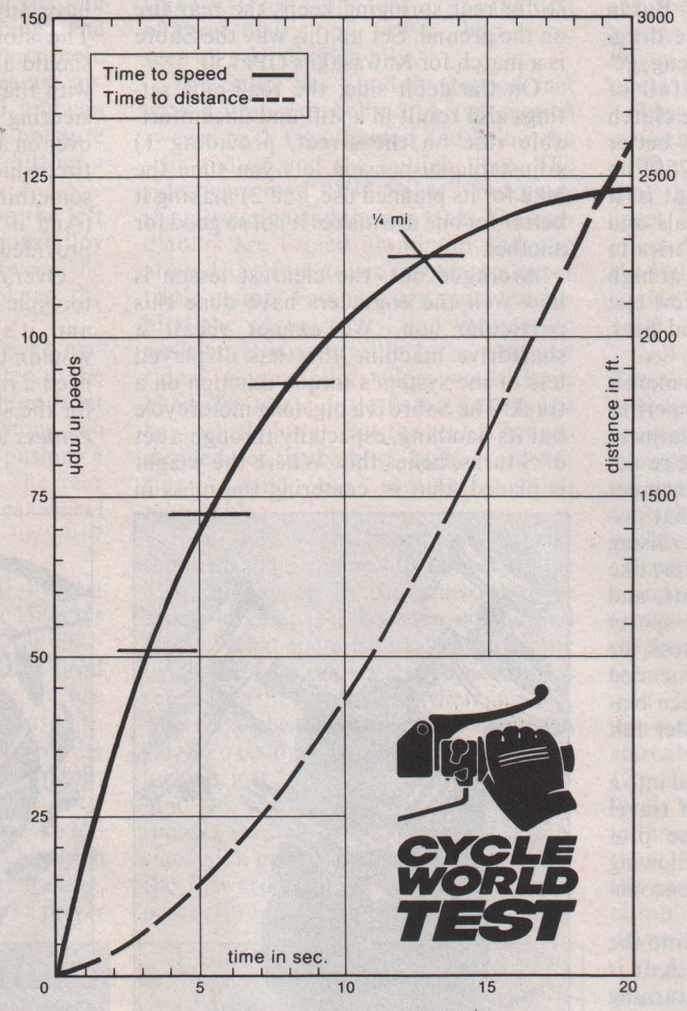
Small chromed-plastic buttons atop left handlebar control pod select clock or stopwatch display, and start/stop/clear stop watch.

HONDA V45 SABRE

SPECIFICATIONS

List price $3398
Engine .....water-cooled dohc V-Four
Bore x stroke ....70 x 48.6mm
Displacement.....748cc
Compression ratio 10.5:1
Carburetion .....(4) 32mm Keihin CV
Air filter .....oiled foam
Ignition .....transistorized electronic
Claimed power ....80.3 bhp @ 9500 rpm
Claimed torque ..46.2 lb.-ft. @ 8000 rpm
Lubrication .....wet sump
Oil capacity .....3.2 qt.
Fuel capacity .....4.8 gal.
Starter .....electric
Electrical power.....300 w alternator
Battery 12v/14ah
Headlight 45/65w
Primary drive .....straight-cut gear
Clutch.....multi-plate wet
Final drive .....shaft
Gear ratios, overall:1
6th 4.92
5th 5.89
4th 7.05
3rd 8.48
2nd 10.63
1st 15.06
Suspension:
Front.....telescopic with anti-dive
travel .....5.5 in.
Rear..... single-shock swing arm
travel .....4.2 in.
Tires:
Front..... 110/90-18 Bridgestone L303
Rear..... 130/90-17 Bridgestone G508
Brakes:
Front..... dual 10.8 in. disc
Rear..... 6.25 in. drum
Brake swept area ..161 sq. in.
Brake loading (160-lb. rider) .....4.25 lb./sq. in.
Wheelbase .....61.5 in.
Rake/Trail .....29.5°/4.6 in.
Handlebar width .....29 in.
Seat height .....31.5 in.
Seat width .....9.0 in.
Footpeg height.....12.4 in.
Ground clearance .....7.5 in.
Test weight (w/half-tank fuel) ..525 lb.
Weight bias, % front/rear.....48/52
GVWR .....950 lb.
Load capacity ..... 425 lb.

ACCELERATION



PERFORMANCE

Standing ¼-mile....12.16 sec. @ 108.43 mph
Top speed in ½-mile .....123 mph
Fuel consumption ...49.5 mpg
Range (to reserve tank) ...183 mi.

Acceleration:
0–30 mph..... 1.8 sec.
0–40 mph..... 2.7 sec.
0–50 mph..... 3.6 sec.
0–60 mph..... 4.6 sec.
0–70 mph..... 5.5 sec.
0–80 mph..... 6.6 sec.
0–90 mph..... 7.8 sec.
0–100 mph .....9.7 sec.

Top gear acceleration:
40–60 mph.....5.0 sec.
60–80 mph .....5.7 sec.

Maximum speed in gears:
1st..... 51 mph
2nd..... 72 mph
3rd.....90 mph
4th.....109 mph
5th.....130 mph
6th .....156 mph

Speedometer error:
30 mph indicated... 29 mph
60 mph indicated ...58 mph

Braking distance:
from 30 mph.....32 ft.
from 60 mph..... 119 ft.

Engine speed at 60 mph .....3858 rpm